

NON-PUBLIC?: N
ACCESSION #: 8907280187
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Callaway Plant Unit 1 PAGE: 1 of 6

DOCKET NUMBER: 05000483

TITLE: Plant Shutdown Required by the Plant's Technical Specification (T/S), an Engineered Safety Feature Actuation, and the Late Completion of a T/S Action

EVENT DATE: 06/23/89 LER #: 89-008-00 REPORT DATE: 07/24/89

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION

50.73(a)(2)(i) and 50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

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Operations & Maintenance

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: AA COMPONENT: ECBD MANUFACTURER: W120
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

At 0840 CDT on 6/23/89, Control Rod Bank 'B' failed to move and was declared inoperable in Mode 1 - Power Operation at 100% reactor power. At 1102, a plant shutdown was commenced per Technical Specification (T/S) 3.1.3.1

Action b. At 1418 at approximately 3% reactor power, the main turbine was tripped. A protective relay for generator output breaker erroneously sensed a flashover and cleared the 345 KV switchyard bus 'B'. This resulted in a complete loss of power to the 4.16 KV Safeguards Bus NB01. This resulted in an Engineered Safety Feature actuation of the Turbine Driven Auxiliary Feedwater Pump. At 1419, the reactor was manually tripped at 2% reactor power. The plant was stabilized in Mode 3 - Hot Standby. The loss of NB01 had caused radiation monitors, GK-RE-05 and GG-RE-27, to become inoperable. T/S 3.3.3.1 Actions 27 and 30 were not completed within the 1 hour time limit. The plant was restarted at 0210 on 6/24/89 and reached 100% reactor power at about 1500 on 6/25/89.

Two circuit boards in the rod control logic cabinet were replaced. The cause of the loss of NB01 was the failure of a flashover relay due to a loose set screw. The relay was repaired. The cause of the late completion of T/S 3.3.3.1 Actions 27 and 30 was attributable to cognitive personnel errors. These were identified but were not completed within the time remaining. A new procedure will be developed for short time T/S action statements.

END OF ABSTRACT

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BASIS FOR REPORTABILITY

At 1102 CDT on 6/23/89, licensed operators commenced a plant shutdown required by Technical Specification (T/S) 3.1.3.1 Action b, due to a rod control malfunction. The shutdown was completed at 1419 and is therefore reportable per 10CFR50.73(a)(2)(i)(A). During the shutdown, at 1418, all power was lost to a 4.16 KV class 1E Safeguards Bus, NB01 **1, when its offsite source was lost while its backup Diesel Generator (D/G)**2 was (3) out-of-service for maintenance. This resulted in an Auxiliary **3 Feedwater Actuation (AFAS) of the Turbine-Driven Auxiliary Feedwater Pump (TDAFP)**4 an Engineered Safety Feature actuation reportable per 10CFR50.73(a) (2) (iv). The loss of NB01 also made radiation monitors **5, GK-RE-05 and GG-RE-27, inoperable. T/S 3.3.3.1 Actions 27 and 30, were not completed within their 1 hour time limits. This was a condition prohibited by the plant's T/S and is reportable per 10CFR50.73(a)(2)(i)(B).

CONDITIONS AT TIME OF EVENTS

Prior to Shutdown: Mode 1 - Power Operations
Reactor Power - 100%

At Loss of NB01: Mode 2 - Startup
Reactor Power - 2 to 3%

Following Shutdown: Mode 3 - Hot Standby
Reactor Power - 0%

DESCRIPTION OF EVENTS

At 0840 on 6/23/89, in preparation for the monthly control rod operability surveillance per T/S 4.1.3.1.2, an attempt was made to move Control Bank 'B' out two steps. However, Bank 'B' failed to move and was declared inoperable. T/S 3.1.3.1, Action b was entered and utility Instrument and

Control personnel began to troubleshoot. Initial troubleshooting efforts were unsuccessful. At 0913, another attempt to move Bank 'B' resulted in Control Bank 'D' moving instead. Therefore, at 1102, the licensed operators commenced a plant shutdown as required by T/S 3.1.3.1 Action b.

At 1418, at approximately 3% reactor power, the Main Turbine (**6) was tripped. The generator output breakers, V53 and V55 (**7), opened as expected. However, a protective relay (**8) associated with V55, 50FO-V55 located in the Switchyard Control House erroneously sensed a flashover and, therefore, cleared the 345 KV switchyard bus 'B' (**9) by opening the offsite feeder breakers, V45 and V85 (**10). (See the attached diagram.) Because the 'A' D/G was out-of-service for maintenance, the loss of switchyard bus 'B' resulted

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in a complete loss of power to the 4.16 KV class 1E Safeguards Bus, NB01. The undervoltage on NB01 generated an AFAS which automatically started the TDAFP by design. At 1419, the reactor was manually tripped from 2% reactor power in accordance with procedure OTO-SF-00006, "Failure of Control Bank to Move." The plant was then stabilized in Mode 3 - Hot Standby in accordance with plant procedures.

The loss of power to NB01 caused a Control Room Emergency Ventilation System (**11) (CREVS) radiation monitor, GK-RE-05 and a Fuel Building Ventila-

tion System (**12) (FBVS) radiation monitor, GG-RE-27, to be inoperable. T/S 3.3.3.1 Action 27 required that the CREVS be isolated and operated in the recirculation mode within 1 hour. Action 30 required that the FBVS be isolated and operation of the Emergency Exhaust System be initiated within 1 hour. These actions were completed at 1539, which exceeded the 1 hour time limit.

Normal power was restored to NB01 at 1601 that day, which also restored monitor GK-RE-05. The TDAFP was then secured at 1614. The Control Room ventilation was returned to its normal line-up at 1647. Monitor GG-RE-27 was restored at 1830 and the Fuel Building ventilation was returned to normal at 1906. The control rods were retested satisfactorily and returned to service at 1920. The faulty relay was repaired and breaker V55 was made available at 0015 on 6/24/89. The plant was restarted at 0210 and reached 100% reactor power at about 1500 on 6/25/89.

ROOT CAUSE

1. The root cause of the rod control problem was determined to be the component failures of two circuit boards in the rod control logic cabi-

net (**13). These were a Supervisory Buffer Memory Card (**14), A111, and a Bank Overlap logic Card (**15), A207. The failures of these cards caused the rod control logic to randomly select Control Bank 'B', Control Bank 'D', or Shutdown Bank 'B' when Control Bank 'B' was selected on the Main Control Board Bank Selector Switch (**16).

2. The root cause of the loss of NB01 was also determined to be a component failure. The flashover relay, 50FO-V55, for V55 failed to reset due to a loose calibration set screw. This relay protects the Main Generator (**17) to from flashover by clearing switchyard bus 'B' when a high current is detected with V55 open. The current setting of this relay was at approximately 1200 Amps. The breaker had been carrying approximately 1400 Amps earlier in the day. When the current was reduced, the relay failed to reset and, therefore, indicated a flashover as soon as V55 was opened.

3. The root cause of the late completion of T/S 3.3.3.1, Actions 27 and 30, was attributable to cognitive personnel errors. These events occurred in conjunction with a manual reactor trip. Licensed operators were very

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busy taking appropriate actions in accordance with procedures, E-0, Reactor Trip or Safety Injection and ES-0.1, Reactor Trip Response. Upon completing ES-0.1, they reviewed T/S and identified the need to isolate the CREVS and FBVS within 1 hour. These were all identified within the required time frame. However, the identification was not in time to complete the isolation of the CREVS and FBVS until 1 hour and 20 minutes had elapsed.

CORRECTIVE ACTIONS

1. The defective rod control circuit boards were replaced. The components found defective on the boards will be included in the existing component failure trending program.
2. Flashover relay, 50FO-V55, was recalibrated and returned to service. Breaker V55 was power factored to ensure the absence of an actual fault in the breaker.
3. Operation's personnel will develop a procedure to aid in quickly identifying and implementing the short time (less than 4 hour) T/S action statements.

SAFETY SIGNIFICANCE

The primary safety function of the Rod Cluster Control Assemblies (**18)

is to facilitate shutdown of the reactor when a limiting safety system setting

is approached. The performance of Technical Specification 4.1.3.1.2 verifies that the control rods are not mechanically bound (i.e., they are able to move freely) and are therefore capable of performing this safety function. Although this could not be verified when the surveillance was attempted, indications were that the cause of failure was associated with the control logic and not with the free movement of the rods. The manual reactor trip verified the rods were capable of being tripped and performing their intended safety function.

Following the loss of power to NB01, a redundant 4.16 KV Class 1E Safeguards Bus, NB02, was available to supply power to the 'B' train safety-related loads. The redundant radiation monitors were also available. Therefore, this event posed no threat to the public health and safety.

PREVIOUS OCCURRENCES

LER 86-029-00, dated 09/23/86, ULNRC-1373

LER 86-024-02, dated 01/30/87, ULNRC-1439

LER 85-048-00, dated 11/29/85, ULNRC-1214

LER 85-011-00, dated 03/25/85, ULNRC-1065

LER 84-052-00, dated 11/15/84, ULNRC-0974

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LER's 86-029-00, 86-024-02, and 85-048-00 were related events similar to this event in that card failures resulted in rod control problems. The root cause of those events was determined to be heat related. A modification was implemented which increased cooling to the rod control logic cabinet.

No similar events have occurred since this modification.

LER 85-011-00 was similar to this event in that a safeguards bus, NB02 was lost and resulted in the automatic actuation of the TDAFP. However, that event was caused by an inadvertent actuation of the startup transformer's fire suppression deluge system(**19).

LER 84-052-00 was similar to this event in that flashover relay, 50FO-V55, erroneously indicated a flashover on V55 and cleared switchyard bus 'B'. Utility relay technicians were performing tests in a relay circuit of V55. Relay 50FO-V55 had been inadvertently left powered. Consequently, during subsequent testing, it gave an erroneous flashover indication. That event also resulted in a loss of power to NB01 followed by a manual reactor trip due to unexpected rod movement. That event was caused by an inadvertent actuation during testing and is therefore unrelated to the current relay

failure.

FOOTNOTES

The system and component codes listed below are from IEEE Standards 805-1984 and 803A-1983, respectively.

- 1) System - EB Component - BU
- 2) System - EK: Component - DG
- 3) System - BA
- 4) System - BA, Component - P
- 5) System - IL, Component - MON
- 6) System - TA, Component - TRB
- 7) System - FK, Component - BKR
- 8) System - FK, Component - RLY
- 9) System - FK, Component - BU
- 10) System - FK, Component - BKR
- 11) System - VI
- 12) System - VG
- 13) System - AA, Component - CAB
- 14) System - AA, Component - ECBD
- 15) System - AA, Component - ECBD
- 16) System - AA, Component - HS
- 17) System - EL, Component - TG
- 18) System - AA, Component - ROD
- 19) System - KP

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Figure "Callaway Plant Switchyard" omitted.

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UNION ELECTRIC

Callaway Plant 24 July, 1989

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ULNRC-2043

Gentlemen:

DOCKET NUMBER 50-483

CALLAWAY PLANT UNIT 1
FACILITY OPERATING LICENSE NPF-30
LICENSEE EVENT REPORT 89-008-00
PLANT SHUTDOWN REQUIRED BY THE PLANT'S TECHNICAL
SPECIFICATIONS (T/S), AN ENGINEERED SAFETY FEATURE ACTUATION,
AND THE LATE COMPLETION OF A T/S ACTION

The enclosed Licensee Event Report is submitted pursuant to 10CFR50.73(A)(2)(i)(A), 10CFR50.73(a)(2)(iv), and 10CFR50.73(a)(2)(i)(B) to report the completion of a plant shutdown required by the plant's T/S, the actuation of an Engineered Safety Feature, and the late completion of T/S action requirements.

D. Blosser
Manager, Callaway Plant

TPS/JKB:jew

Enclosure

cc: Distribution attached

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